

**Statement of
T.J. Glauthier
Deputy Secretary
U.S. Department of Energy
to the
Senate Energy and Natural Resources Committee
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Mr. Chairman and Members of the Committee:

By anyone's account, it has been a remarkable quarter century for natural gas in this country.

In the mid-1970s, natural gas was thought to be a declining fuel. Outdated and counter-productive pricing regulations had handcuffed the industry, stifling exploration and production, and conveying the false impression that the Nation's gas supply was on the wane.

Today, the picture is decidedly different. Far from being a dying resource, natural gas is being counted on to fuel much of America's economic expansion for well into the 21st century. The onerous regulations of the 1970s have been replaced by a restructured and highly competitive gas market, and the industry has responded.

In 1992 the National Petroleum Council conducted a major study of the natural gas potential within the United States. The Council, as many Members of the Committee are aware, is an industry advisory panel to the Department. It has some of the top leaders in the oil and gas industry as its members. Its studies are often cited as the definitive view of the industry by those who know the industry the best. The Council's 1992 study concluded that the United States had about 1,300 trillion cubic feet of natural gas resources outside of Alaska.

This past December, the Council issued an update of the 1992 study requested by the Secretary of Energy. The new analysis found that – despite the fact that Americans consumed 124 trillion cubic feet of natural gas since the 1992 study – the estimate of the Nation's gas resource has actually *increased*. It now stands at more than 1,466 trillion cubic feet.

Advances in technology have opened new frontiers, and new production tools have led to more gas being extracted from both newly discovered and older fields.

The Council's study boosted confidence in the future of gas supplies, but it also raised cautions. The Council stressed that adequacy in the ground does not automatically translate into adequacy at the burnertip. There will be challenges to overcome.

For one thing, gas demand is growing faster than virtually anyone predicted. When one looks back at the forecasts made by the Council just 8 years ago, even its most robust expectations for growth in gas demand have been exceeded by what has actually occurred.

The U.S. economy is growing faster than anyone expected. Environmental regulations that favor natural gas consumption are more firmly in place than in 1992 and are becoming increasingly stringent.

Power companies are looking at the quickest, lowest capital cost options to install new generating capacity. In fact, more than half of the growth in demand for natural gas over the next 20 years will come from the electric generation market. The Energy Information Administration's *Annual Energy Outlook 2000* projects that of the 1000 new power plants likely to be built in the United States in the next 20 years, 900 of them will likely be fueled by natural gas.

Overall, the use of natural gas in this country could increase by more than a third in the next 20 years. In the electric power generation industry, demand for natural gas for power generation could increase by as much as 250 percent.

New technologies are clearly spurring the use of more natural gas. Universities and large conference centers – such as Opryland in Nashville and the McCormick Center in Chicago – are now turning to highly efficient combined cooling, heat and power systems fueled by natural gas. The Brookfield Zoo in suburban Chicago now has an onsite natural gas cogeneration system, installed in 1998. A Walgreen's drug store in Chesterton, Indiana, became an energy pacesetter last year when it installed a natural gas "microturbine," about the size of a commercial refrigerator.

In New York's Central Park, the park's only police station is now powered by a natural gas fuel cell. Its installation saved the costs of running a very expensive underground transmission line through the Park.

And lest we overlook some of the traditional uses of natural gas, it is important to point out that natural gas is now the fuel of choice for 70 percent of new single family homes.

Natural Gas Prices – Relatively High Now, But Moderating Over Longer-Term

This year the average wellhead price of natural gas is likely to average more than \$3.00 per thousand cubic feet, higher in nominal terms than any time on record (in constant dollars, prices are the highest since 1985). Spot market prices have reached into the \$4.00-\$4.50 per thousand cubic foot range, although they have declined recently to the \$3.70-\$3.80 range.

We expect prices to remain relatively high at least through the summer and perhaps into this winter. This could result in higher consumer heating bills compared to recent years.

Sharp increases in demand, especially in the electric generation sector, coming on the heels of several years of relatively slow exploration and drilling activity (brought about by prior low prices) have created a somewhat tight supply situation. However, the Energy Information

Administration (EIA) is projecting that if gas injections continue at historically average rates through the remainder of the refill season, gas inventories would be within the normal range, about 4 percent below the 5-year average.

Drilling has rebounded, and supply will eventually catch up to consumption. Wellhead gas prices are projected to return to more typical levels by next spring. Over the longer term, as the Energy Information Administration testimony describes in more detail, wellhead prices are expected to drop back to the \$2.70-\$2.80 per thousand cubic foot range (in 1998 dollars) or perhaps lower if improved exploration and production technology is introduced at a more rapid pace.

The 30 TCF Gas Economy – Not “If” But “When”

All of this points toward continued growth in gas use.

The Energy Information Administration projects that by 2015, annual consumption for natural gas will reach almost 30 trillion cubic feet (tcf) -- up from today's 21 tcf. By 2020, consumption is likely to continue to rise to almost 32 tcf.

The National Petroleum Council forecasts that we could reach the 30 tcf mark sooner, perhaps shortly after the year 2010, and that in two cases, consumption could be as high as 33 tcf by 2015.

The American Gas Foundation published a recent study, conducted by former Deputy Energy Secretary Bill Martin, that describes a scenario in which gas consumption in 2020 could be 60 percent higher than today -- reaching more than 34 tcf. Some forecasters have estimated that if greenhouse gas controls are enacted, demand for natural gas could approach 40 tcf by 2020, nearly doubling today's consumption.

On the other side, there are preliminary indications that structural and efficiency gains in the economy may reduce the projected growth rate for natural gas compared to conventional forecasts. If true, this will tend to strengthen the industry's ability to deliver needed gas supplies. Either way, this underscores the validity of the Administration's efforts to address issues of both supply and efficiency in consumption.

Can the Gas Industry Deliver? A Sense of Cautious Optimism.

These are extraordinary forecasts for a fuel that was virtually given up on in the 1970s. The Energy Department agrees with the National Petroleum Council and others that there is good reason for optimism within the Nation's gas industry.

As the testimony of the EIA shows, this level of growth is not unprecedented, and is about half the rate of growth in the industry from 1955 to 1970. There are challenges, however, as the National Petroleum Council has pointed out. The gas industry will require almost \$1.5 trillion (1998 dollars) in private sector financing through 2015, more than half for new capital investments to find, produce, and transport natural gas. To connect the anticipated 15 million new gas consumers in the next 15 years, more than 255,000 miles of distribution pipelines (27% more than exist today) and 38,000 miles of new transmission lines (a 14% increase) will be needed. The number of wells drilled each year will have to double, and the number of available drill rigs will have to increase by 60 percent. Thousands of new workers will also be needed.

Regarding the need for new pipelines, with the support of this Administration, the Federal Energy Regulatory Commission has adopted a policy statement that increased the flexibility of the provisions it uses to evaluate pipeline projects. The policy statement confirmed that the Commission will begin its environmental review at the time an application is filed. Environmental and economic reviews will continue to proceed concurrently. In cooperation with the gas industry, we have been looking into ways to expedite permit decisions, and other ways to share information more rapidly with state and local jurisdictions that also want input to the process.

Much of the Nation's gas resource resides on federal lands or in federal waters. Two of the most promising regions for future gas production are the Rocky Mountains and the Gulf of Mexico. Most of this gas is available to development now. For instance, over 60 percent of Rocky Mountain gas is open to unrestricted exploration. We have begun several efforts that could help provide even greater access. The National Petroleum Council recommended that an Interagency Working Group be established at the White House to deal specifically with natural gas issues, including access. I am pleased to report that this group has been formed under the leadership of the National Economic Council, and the first staff level meeting occurred last week. Even before the Working Group's formation, the Administration was working on several issues of interest to the industry. For example:

- DOE, the Bureau of Land Management (BLM), the Forest Service, the Environmental Protection Agency, the Fish and Wildlife Service, the National Park Service, and the Bureau of Indian Affairs have joined to develop ways to streamline the environmental review processes that must be conducted before drilling on federal lands in the Rocky Mountain region can occur.
- We have joined with the Wyoming State Geological Survey, the Wyoming Oil and Gas Conservation Commission, and several federal agencies to develop a science-based regional assessment of oil and gas resources throughout the State. This assessment, which crosses over ownership boundaries, will be available for use in future resource development.

- We're working jointly with BLM to develop technologies that are particularly applicable to oil and gas production on federal lands. In the past, this has included air quality monitoring in Wyoming and land remediation in Oklahoma. This year, we will be conducting coalbed methane research in Colorado and Wyoming, analyzing compressor noise on wildlife in New Mexico, studying the effects of oil and gas activities on wildlife in Wyoming, and developing a model for predicting cultural resources in Nevada.

This Administration also has continued to stress energy efficiency in consumption. For example, working closely with industry, we recently announced the deployment of a gas turbine that is the first to top the 60 percent efficiency threshold -- the "four minute mile" of turbine technology. When the Energy Department began its advanced turbine development program in the early 1990s, the best turbines available had efficiencies of about 50 percent. This 20% improvement in efficiency means that, if we could replace all of our natural gas generators tomorrow with similar equipment, we could save 400 billion cubic feet of gas per year.

Given these kinds of results, we feel that, by continuing to work hand in hand with industry, the development of larger and stronger natural gas infrastructure within our growing economy is well within our grasp.

The Promise – and Necessity – of New Technology

Advanced technology – from both a production and an environmental standpoint – will be one of the most critical factors in determining whether natural gas achieves its full potential.

As the Energy Information Administration points out, rapid technology development could translate into as much as 2.7 trillion cubic feet of additional gas produced domestically in the U.S. by 2015 compared to a slow rate of technology development (or 1.25 trillion cubic feet of additional gas compared to the "business as usual" reference case). The price impact could be even more dramatic – the wellhead price of natural gas could be as much as 44 percent cheaper by 2015 if the pace of technology development is rapid compared to the slow technology case (or nearly 20 percent cheaper compared to the reference case).

One of the points stressed by the National Petroleum Council was the remarkable progress in technology that was not fully anticipated in 1992. Three-dimensional seismic technology now allows producers to spot small hydrocarbon accumulations that would have been bypassed just a few years ago.

New time-lapse reservoir modeling – or as it is commonly called, 4-D seismic – coupled with other imaging technology now allows producers to "see" reservoir events, such as a gas cap enlarging as oil is produced. In the future, real-time reservoir modeling will use these techniques to allow drilling and field decisions to be made more rapidly, on-the-spot, to maximize production.

If gas is to achieve its full potential, tomorrow's gas producers will have to drill deeper, faster, and smarter. The Department of Energy helped pioneer the polycrystalline diamond drill bit, the measurement-while drilling technology, the "thru-casing" logging system, and several other innovations that have allowed the hydrocarbon industry to probe deeper into more hostile environments searching for natural gas.

But if tomorrow's producers are to keep pace with the steadily growing demand for natural gas, even more impressive innovations will be needed. The drilling systems of the future will likely need to be "smart systems," incorporating rugged integrated circuitry to monitor conditions at the drill bit, analyze for hydrocarbons in "real time," and steer the bit through rock that is deeper and denser than has ever been encountered before.

Recently, for example, new gas research projects were selected to determine the feasibility of using a laser to drill natural gas wells, to improve a novel "down-hole hammer" which uses the power of the drilling fluid to help drive a drill bit into a gas-bearing formation, and to develop an ultra-lightweight cement that could help lower the costs of completing natural gas wells.

A little over a year ago in southwestern Wyoming, in a project we helped cosponsor, Union Pacific Resources drilled a 17,000 foot deep well with a 1,700-foot horizontal section – one of the longest horizontal wells drilled into the tight sand formations of the Rocky Mountains. Production was far above expectations, and that has led to additional privately funded horizontal wells in the same Green River formation.

This project is especially important because onshore production from nonconventional formations – like the Rocky Mountain tight sands – is likely to increase significantly over the next 10 years. By 2015, as much as a quarter of the natural gas we produce in the United States could be coming from unconventional gas reservoirs.

The offshore Gulf of Mexico is another prime area for increased gas production. New technology now allows producers access to gas supplies in ocean waters more than a mile deep, and exploration wells are now being completed in over 8,000 feet of water. Exploration in this deep water can be attributed to this Administration's support. By granting deepwater royalty relief, the Administration has accelerated, perhaps by years, the development of deepwater technologies and the rate at which these deeper formations have come into production.

In the even longer term, there may be the potential for tapping the enormous energy potential of methane hydrates beneath the ocean floors or the Arctic tundra – but that may require technologies we can only imagine today.

The Potential for "White Crude" from Remote Gas Sources

In Alaska's far North Slope, there are vast natural gas resources that in the past have been unmarketable because there was no cost-effective means for transporting the fuel in gaseous form. Recently, as natural gas demand and prices have increased, several companies have begun reevaluating the economic potential of new pipeline projects to transport North Slope gas to North American consumers. Ultimately, market economics and environmental considerations will dictate which, if any, of the competing pipeline projects will proceed.

Our role at the Energy Department is to help assure that all technological options are available for tapping the potential of North Slope gas. One of these options is to use the gas as the chemical "building blocks" for synthesizing liquid fuels.

In liquid form – or as it has been called, "white crude" – the natural gas from the North Slope could keep the TransAlaska Pipeline System (TAPS) flowing well beyond its currently projected economic lifetime and supply liquid fuels that could help the U.S. reduce its dependence on imported crude oil.

Two years of research in our gas-to-liquids program is now reaching the point where several classes of ceramic membranes and seal materials have been proven suitable for chemically converting natural gas into gases that could be recombined into liquid fuels. Cost savings of up to 30 percent over conventional gas separation processes appears to be within reach. In FY 2001, a prototype membrane unit capable of processing 24,000 cubic feet per day of syngas (equivalent to 0.75 barrels per day) will be built and tested. Design and engineering will be started on an even larger, 500,000 cubic-foot-per-day unit (equivalent to 15 barrels per day).

A New Initiative in Infrastructure

Tomorrow's research partnerships must also extend beyond just the gas field itself. For the first time, in our fiscal year 2001 budget, the Energy Department included a funding request for significant research into the infrastructure of future gas delivery.

Pipeline and local distribution companies will continue to rely on the development of advanced technology for reducing operation and maintenance costs. There will need to be research to reduce stress corrosion and cracking in gas transmission and distribution lines. There will be a need for smarter, automated, inside-the-pipe inspection systems that can not only sense weak points but repair them. There will be a need to develop portable optical imaging technology to detect natural gas leaks in pipelines, storage and processing facilities. There will be a need for new technologies that can expand storage capacity near market centers to meet peak demand periods.

The Strategic Center for Natural Gas

But it's not just a question of the dollars we are spending – but whether we are spending them in the most efficient manner to address the right issues.

Three different parts of the Department are responsible for spending the \$200-plus million dollars we direct annually at natural gas-related research and development. But until recently, there was no single focal point to coordinate those efforts or to determine if there were gaps in the Energy Department's natural gas portfolio.

I'm pleased to report that this has changed. Last December, Secretary Richardson announced his intent to create a new Strategic Center for Natural Gas as part of our new National Energy Technology Laboratory in Morgantown, West Virginia, and Pittsburgh, Pennsylvania. In March, the Center became operational.

Its mission is to work with the Nation's gas producers and users, to set the course for future gas policies and programs, and to help ensure that this country has the technological capability to meet tomorrow's demands for natural gas.

The Center will perform four key functions:

- *Spearhead annual DOE-wide gas RD&D planning and program assessment.* The Gas Center will work closely with other DOE offices¹ to develop an integrated Natural Gas Strategic Plan that will establish high-level budget and policy priorities for all natural gas programs within the Department. The Center will also provide support to individual program offices for detailed natural gas road-mapping activities in each market sector to provide a consistency of approach. In addition, the Center will identify gas in the Department's natural gas programs and work closely with other policy and planning activities to establish appropriate government-industry partnerships to fill priority research and analytical needs.
- *Provide science and technology advances through the Laboratory's on-site programs.* Through in-house research at the National Energy Technology Laboratory, the Center will provide cutting-edge science and technology for the clean, efficient production and use of natural gas. For example, the Gas Energy Systems Dynamics Focus Area is developing the basic science to understand the unsteady processes of natural gas combustion and conversion in advanced energy technologies, such as fuel cells, combustion turbines, and coupled turbine-fuel cell systems. Other onsite research areas

¹ These offices will include the Offices of Fossil Energy (FE), Energy Efficiency and Renewable Energy (EE), Science, Policy, International Affairs, and the Energy Information Administration.

to be emphasized by the Gas Center include computational analyses of advanced turbine and fuel cell components, methane hydrates, and the geologic sequestration of greenhouse gases.

- *Shape, fund, and manage extramural research and development.* A major activity of the Gas Center will be to manage gas-related contracts and grants with U.S. industry, universities, and other national laboratories. The Gas Center will form an alliance with the National Renewable Energy Laboratory (NREL) to provide for the complementary implementation of a complete portfolio of gas and other energy technologies.²
- *Conduct studies to support policy development.* The Gas Center will develop and use analytical tools to assess natural gas policy options. This will be done in conjunction with DOE's headquarters program offices, the Office of Policy, and the Energy Information Administration.

Conclusion

It took us a quarter century to realize the true extent of the domestic energy treasure we have beneath us in the form of natural gas. Now, we must understand and take on the challenges if the full value of that treasure is to be realized over the next quarter century.

Advances in technology do not happen overnight – nor do they happen in a vacuum. Both industry and government are going to have to work hard to keep the technology moving forward. The growing dominance of independent producers in this country, many already strapped for cash, will create new challenges for R&D investments. The phase out of the R&D tariffs that supported the technology efforts of the Gas Research Institute will be another important factor.

If gas is to live up to its expectations, the need to fill these funding gaps – the need to leverage funding in research partnerships, including partnerships with the Federal government – will become increasingly important. The Administration has learned the hard lessons of the 1970s where excessive regulation of the market caused more problems than it solved. We have a strong record of supporting natural gas, and are confident that working in partnership with industry, natural gas will play an important part in America's energy future.

This completes my prepared statement. I will be pleased to answer any questions Committee members may have.

² On July 14, 2000, 18 representatives of the natural gas and renewable energy industries signed a "statement of principles" to develop a new alliance to promote a common agenda for the development of natural gas and renewable energy technologies.